Attorney Docket No.: SP02-260

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A chemical-mechanical manufacturing process ~~for planarizing or polishing semiconductor, metal, dielectric, glass, polymer, optical, and ceramic materials~~, the process comprising:

a) providing a workpiece, said workpiece comprising one of a semiconductor, a metal, a dielectric material, a glass, a polymeric material, an optical material, and a ceramic material;

b) providing a chemical-mechanical planarizing colloidal slurry, said slurry comprising a non-agglomerated plurality of multi-component particles, wherein each of the plurality of multi-component particles consists essentially of at least one of a mixed-oxide, an oxyfluoride, ~~or~~ and an oxynitride composition, each particle exhibiting a modified surface chemistry performance and having an isoelectric point (pH_{IEP}) greater than the pH of dispersed particles in solution; and

c) abrading a surface of said workpiece with said multi-component particles, wherein abrading the surface planarizes or polishes at least a portion of the workpiece.

2. (Original) The process according to claim 1, wherein said particle surface chemistry is modified relative to the surface chemistry performance of the individual, original base constituents of said mixed-oxide particle.

3. (Original) The process according to claim 2, wherein said isoelectric point of said multi-component particle is displaced toward an alkaline pH value relative to the surface chemistry performance of the individual, original base constituents of said particle.

4. (Original) The process according to claim 1, wherein said particle has an isoelectric point (pH_{IEP}) greater than or equal to about 5-6 with a stabilized particle dispersion at pH values of interest for CMP operations.

5. (Original) The process according to claim 1, wherein said isoelectric point of said multi-component particle is greater than or equal to about pH 7.

PAGE 4/11 * RCVD AT 3/9/2007 1:49:30 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/18 * DNIS:2738300 * CSID:6079743848 * DURATION (mm-ss):03-30

6. (Original) The process according to claim 1, wherein said multi-component particles have a composition $\alpha_x\beta_y$, wherein α is a transition metal, metalloid, alkaline earth, rare earth, or alkali element, or a plurality combination thereof, β is O and/or N, and x and $y \neq 0$.

7. (Withdrawn) The process according to claim 6, wherein SiAlON is a plurality combination.

8. (Currently amended) The process according to claim 6, wherein quantities of glass-formers/modifiers comprising at least one of Al_2O_3, B_2O_3, CeO_2, GeO_2, P_2O_5, PbO_2, Ta_2O_5, TiO_2, and ZrO_2[[,]] are added to silicate materials to adjust the surface chemistries and hardness of said particles.

9. (Previously presented) The process according to claim 6, wherein for non-silicate-based materials α is selected from the group consisting of Al, As, B, Ca, Co, Ce, Cr, Cu, Er, Fe, Ga, Ge, In, K, La, Li, Mg, Mn, Na, Ni, P, Pb, Pr, Sb, Sn, Ta, Ti, Tl, Tm, V, W, Y, Yb, Zn, and Zr.

10. (Currently amended) The process according to claim 1, wherein said mixed-oxide components include CeO_2-ZrO_2; CeO_2-Al_2O_3; GeO_2-SiO_2; GeO_2-Al_2O_3-SiO_2; Al_2O_3-SiO_2; CaO-Al_2O_3-SiO_2;[[,]] P_2O_5-SiO_2, TiO_2-SiO_2, Ta_2O_5-SiO_2, Sb_2O_3-SiO_2, Sb_2O_3-Al_2O_3-α_2O-SiO_2, wherein α = Li, Na, K, Rb, Cs; βO_a-Al_2O_3-SiO_2, wherein β = Be, Mg, Ca, Ba, Sr, and $a \neq 0$; MgO-Al_2O_3; or such compositions doped with ~1 or 3-15 wt% F.

11. (Previously presented) The process according to claim 1, wherein said abrasive has a multi-component composition comprising a combination of constituents selected from the group consisting of SiO_2, Al_2O_3, B_2O_3, and at least two or optionally three other oxides.

12. (Original) The process according to claim 1, wherein said mixed-oxide particle comprises in weight percent on an oxide basis, about 30-99% SiO_2, 1-37% Al_2O_3 and at least one of the following: 0-70% Li_2O, 0-70% Na_2O, 0-70% K_2O, 0-70% BeO, 0-70% MgO, 0-70% CaO, 0-70% SrO, 0-70% BaO, 0-70% SbO_2, 0-70% SnO_2, 0-70% B_2O_3, 0-70% GeO_2, 0-70% CuO, 0-70% CuO_2, 0-70% P_2O_5, 0-70% PbO_2, 0-70% Ta_2O_5, 0-70% TiO_2, 0-70% CeO_2, 0-70% ZrO_2, and/or 0-20% F, either alone or in combinations thereof.

PAGE 5/11 * RCVD AT 3/9/2007 1:49:30 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/18 * DNIS:2738300 * CSID:6079743848 * DURATION (mm-ss):03-30

13. (Withdrawn) The process according to claim 1, wherein said mixed-oxide particle includes at least three constituents selected from either SiO_2- or Al_2O_3-derivatives doped with metalloid, transition metals, alkali, alkaline earth, or rare earth components.

14. (Original) The process according to claim 1, wherein said particles are fumed silicate particles.

15. (Original) The process according to claim 1, wherein said multi-component particle has a pre-selected surface chemistry and hardness tailored to said workpiece surface.

16. (Original) The process according to claim 1, wherein said multi-component particle has at least two components, and with a particle size in the range of about 1–30 nanometers.

17. (Original) The process according to claim 1, wherein said multi-component particle has at least three components, and a particle size in the range of about 1-500 nanometers.

18. (Original) The process according to claim 17, wherein said multi-component particle has at least three components, and each with a particle size in the range of about 1-200 nanometers.

19. (Original) The process according to claim 1, wherein said multi-component particle has at least three components, and a particle size in the range of about 1-150 nanometers.

20. (Original) The process according to claim 19, wherein the size of said multi-component particles range from about 10 nm to up to about 150 nm.

21. (Original) The process according to claim 1, wherein said multi-component particles each has either a spherical, near-spherical, elongated, or amorphous morphology.

22. (Original) The process according to claim 1, wherein said multi-component particles are formed according to a flame hydrolysis process.

PAGE 6/11 * RCVD AT 3/9/2007 1:49:30 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/18 * DNIS:2738300 * CSID:6079743848 * DURATION (mm-ss):03-30

23. (Original) The process according to claim 1, wherein said multi-component particles are formed according to a sol-gel process.

24. (Original) The process according to claim 1, wherein said multi-component particles are dispersed in either an aqueous or non-aqueous suspension.

25. (Withdrawn) The process according to claim 1, wherein said multi-component particles are either oxyfluoride or oxynitride compositions.

26. (Original) The process according to claim 1, wherein said workpiece has a non-planarized surface.

27. (Original) The process according to claim 1, wherein providing a workpiece includes providing a semiconductor integrated circuit workpiece having a metallized interconnection structure.

28. (Original) The process according to claim 26, wherein providing a workpiece includes providing a semiconductor integrated circuit silicon wafer with a lithographic integrated circuit pattern and depositing at least one metallized interconnection layer.

29. (Original) The process according to claim 1, wherein providing a workpiece includes providing a semiconductor integrated circuit workpiece having an interlevel dielectric structure.

30. (Original) The process according to claim 28, wherein providing a workpiece includes depositing an interlevel dielectric material on a semiconductor integrated circuit workpiece.

31. (Previously presented) A method for using a CMP slurry solution, the method comprising providing a ~~solution of~~ a slurry comprising a plurality of multi-component particles, wherein each of said plurality of multi-component particles ~~having a composition comprising~~consists essentially of mixed ~~1)~~ metal or metalloid oxides, ~~2)~~ mixed oxyfluorides, ~~or 3)~~ mixed metal or metalloid oxynitrides, ~~each grouping (1, 2, or 3) individually alone~~ or ~~in~~ combination thereof, each of said plurality of multi-component particles exhibiting a modified surface chemistry

PAGE 7/11 * RCVD AT 3/9/2007 1:49:30 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/18 * DNIS:2738300 * CSID:6079743848 * DURATION (mm-ss):03-30

performance and having an isoelectric point (pH_{IEP}) greater than or equal to about 5-6 with a stabilized particle dispersion at pH values of interest for CMP operations; dispersing said plurality of multi-component particles in a slurry; and applying said slurry to a workpiece.

32-65. (Canceled)

PAGE 8/11 * RCVD AT 3/9/2007 1:49:30 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-5/18 * DNIS:2738300 * CSID:6079743848 * DURATION (mm-ss):03-30